

CORRESPONDENCE

The Editor,

Journal of Glaciology

SIR, *Petermann Gletscher: possible source of a tabular iceberg off the coast of Newfoundland*

In a recent letter to *Nature* (Robe and others, 1977) the authors presented five consecutive pictures of a tabular iceberg off the Grand Banks of Newfoundland taken by the U.S. Coast Guard in May–June 1976. It had a rippled surface pattern, and when first seen it was about 0.19 km² in area. This type of iceberg, as the authors pointed out, is very rare in this area, and they mentioned three possible sources: the ice shelves of northern Ellesmere Island, Humboldt Gletscher, and Petermann Gletscher.

Having spent considerable time in Nares Strait (Fig. 1) over the last seven years in the course of a study of its ice regime, I am of the opinion that the evidence is overwhelmingly in favour of Petermann Gletscher, an opinion that is shared by the authors of the letter (personal communication from R. C. Kollmeyer). Humboldt Gletscher produces high blocky bergs of relatively small areal extent, most of which appear to ground in eastern Kane Basin and stay there. The Ellesmere ice shelves are more likely sources, but their surface pattern is different, simpler, and on a larger scale. Furthermore there were no ice islands observed in Nares Strait up to the end of August 1974 or in the spring of 1975, and no report of any break-out from the ice shelves.

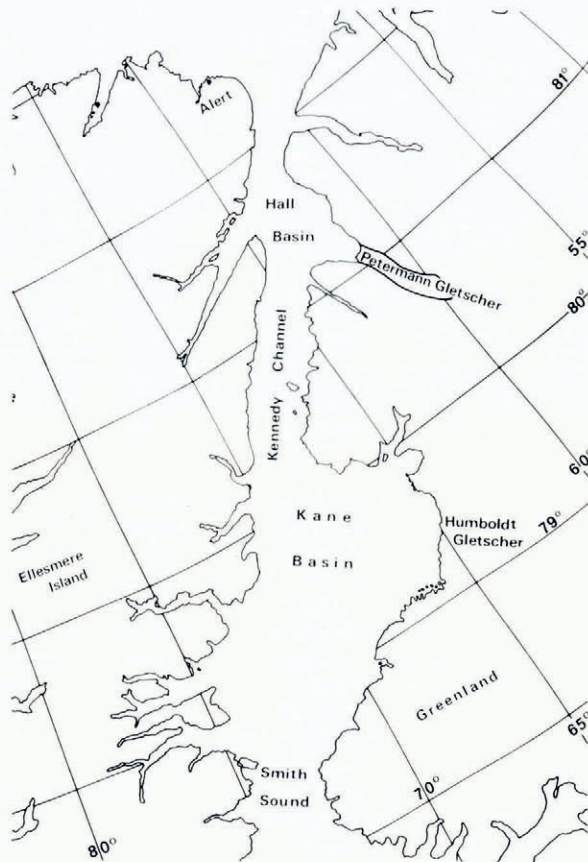


Fig. 1. Map of Nares Strait.

Petermann Gletscher, on the other hand, has a low flat tongue and exactly the surface characteristics of the berg photographed by the U.S. Coast Guard, and there is evidence of calving activity in 1974. The glacier is apparently slow-moving, and apart from a few old grounded fragments there had been no icebergs seen in its vicinity from the start of the Nares Strait study in 1970 up to the end of the summer of 1974. However, in May 1975 a number of flights were made in the area in a Beaver aircraft, in the course of which about a dozen low flat icebergs, all except one quite small in area, were observed in Hall Basin and Kennedy Channel. The exception was a large iceberg which was quite close to Petermann Gletscher, just off the east cape of the entrance to Kennedy Channel (Fig. 2). As there had been no sign of these icebergs when we left the area at the end of August 1974, it was concluded they must have broken off Petermann Gletscher later in the year, probably September, before the fast ice had formed in eastern Hall Basin.

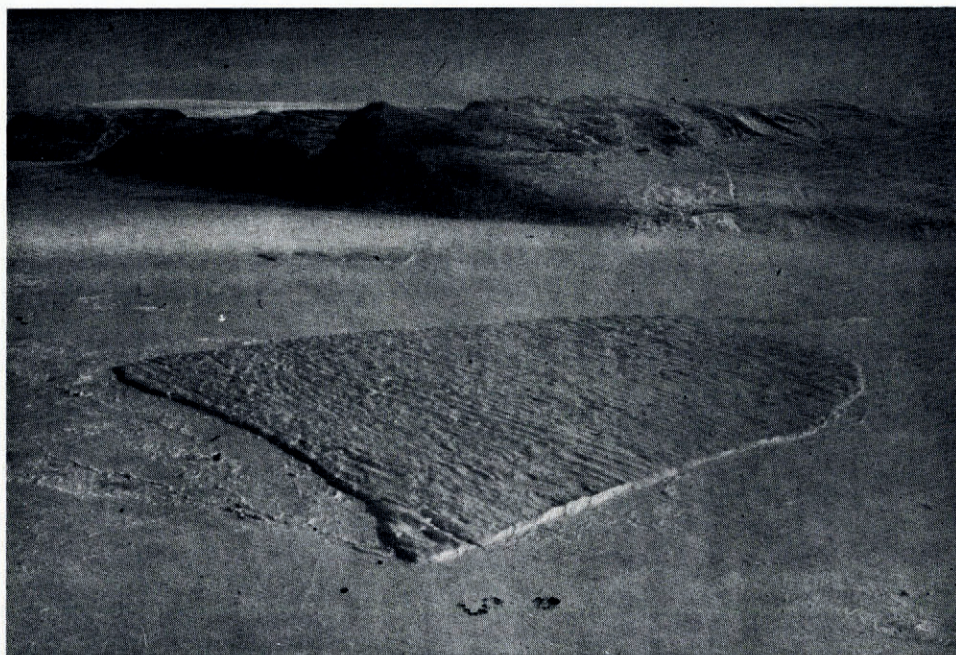


Fig. 2. Iceberg off Kap Lucie Marie, 20 May 1975. Flight altitude 900 m.

In March 1975 the whole of Nares Strait had been imaged by the Canadian Forces with a Sideways-Looking Airborne Radar (SLAR). Figure 3 is a tracing of the tongue of Petermann Gletscher as shown in the SLAR imagery. The centre line represents the flight track and the blank strip on each side is the area under the aircraft not seen by the SLAR. The position of the iceberg is also shown. It was measured from the imagery at approximately $2 \text{ km} \times 1.5 \text{ km}$, or 3 km^2 .

Unfortunately the iceberg, although identifiable when flying over it and using the SLAR image as a map, does not really stand out in the imagery as being different from the multi-year ice floes, so it is not possible to say whether or not there are others in the imagery. Certainly this was the only large iceberg in the part of the strait covered by the Beaver flights, which extended from Alert south to the head of Kane Basin. There could of course have been others farther south, but the intriguing possibility exists that the iceberg photographed by the U.S. Coast Guard in 1976 was in fact part of the same one seen in Hall Basin the year before. The relative sizes leave plenty of room for break-up and deterioration between the two sightings. The average speed of movement necessary to get it to the 1976 position, calculated from a known break-up date for Nares Strait in 1975 of 20 July, is 0.16 m/s (0.32 knots). This is no small speed, but it is quite in keeping with the measured speeds of the pieces of the ice island WH5 in 1963–64 (Nutt, 1966).

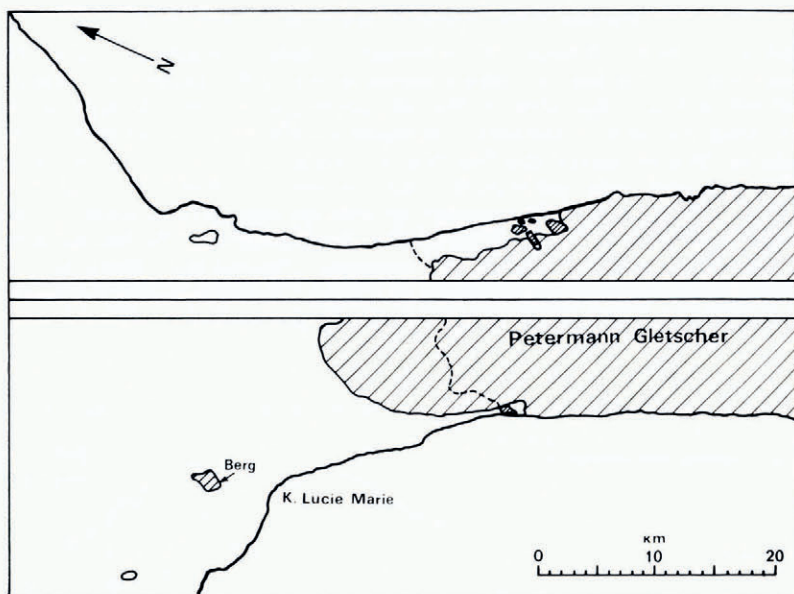


Fig. 3. Tongue of Petermann Gletscher, as imaged by SLAR, 13 March 1975. The solid line represents the imaged outline, the dashed line the glacier front as shown on the current maps.

The authors of the previous letter have been kind enough to exchange prints of the original photographs in the hope that we might be able to establish whether or not they were the same, but unfortunately the low-level oblique photograph (Fig. 2) is not adequate for such a comparison. One interesting point that emerges from the study, however, is that it is likely there will be more icebergs from Petermann Gletscher in the next few years. The dashed line in Figure 3 represents the snout of the glacier as it appears on the current Canadian maps. It is believed to be based on Danish air photographs, probably taken in the early 1950's, as the outline is the same on a map dated 1955. It will be seen that since that time the glacier has advanced about ten kilometres in the centre and lost a fair amount of ice from the north-east side; the south-west limit has remained about the same. It is probably from the north-east side that the 1975 icebergs came; a few more may in fact be seen there in the SLAR imagery, broken off and waiting to come out. Some time in the not-too-distant future the free-floating central part of the tongue is likely to break up, and when that happens some very large icebergs may be expected off the coasts of Labrador and Newfoundland.

Defence Research Establishment Ottawa,
Department of National Defence,
Ottawa, Ontario K1A 0Z4, Canada
8 December 1977

MOIRA DUNBAR

REFERENCES

- Nutt, D. C. 1966. The drift of ice island WH5. *Arctic*, Vol. 19, No. 3, p. 244-62.
Robe, R. Q., and others. 1977. Iceberg deterioration, [by] R. Q. Robe, D. C. Maier [and] R. C. Kollmeyer. *Nature*, Vol. 267, No. 5611, p. 505-06.